FOREST RESEARCH NOTES

CALIFORNIA FOREST AND RANGE EXPERIMENT STATION

FOREST SERVICE
U.S. DEPARTMENT OF AGRICULTURE
IN COOPERATION WITH THE UNIVERSITY OF CALIFORNIA
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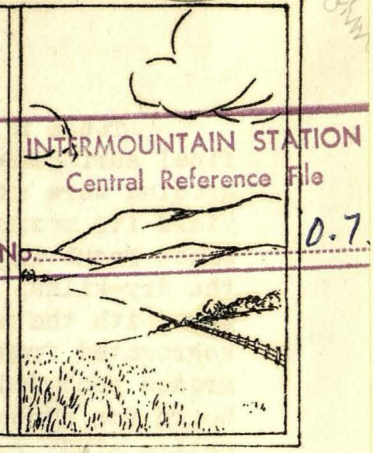

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Research Note No. 11 August 13, 1936

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THROUGH MILL, KILN, AND PLANER WITH 100 TREES 1/

Some preliminary summaries from a study in which boards from various classes of ponderosa pine logs were individually numbered and graded in the green, reinspected again rough-dry, and finally reinspected after surfacing.

In a study recently conducted by this Station in cooperation with one of the largest operators in the California pine region, 100 ponderosa pine trees were selected, principally in the smaller size classes, for "follow-through" observation from stump to seasoned, surfaced lumber. A summary of the number of trees by diameter groups, their scaled and tallied volumes, and the average surfaced-lumber selling value of each size group are shown in table 1.

The trees selected were restricted principally to the smaller sizes because it appeared unwise to attempt an initial experiment of this kind with a large volume of lumber and also because previous log and tree evaluation studies in this region have not included adequate samples of trees through the lower range of diameters. Of the 100 trees, slightly over one-half were from 15 to 24 inches in diameter breast high, measured outside the bark. Only 13 trees were larger than 34 inches d.b.h. The largest tree marked, 57 inches d.b.h., was selected especially for the samples of large knotted, coarse logs it contained. This tree, growing in the open, had large green branches all the way to and including the butt log. Its low average selling value per M B.M. is a good illustration of what happens to quality increment when there is no nearby competition to cause natural dying off of the lower branches when the tree is small.

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Table 2 shows how the marked green-chain grades compared with the final surfaced-grade recovery. The study inspectors who did the green-grading were experienced shipping graders who marked each board so it would yield its maximum apparent value. Rip and trim marks were shown on each piece requiring further remanufacture. All study lumber went directly to the dry-kilns, where it was sorted, stacked, and seasoned in general admixture with the mill run. On the dry chain, the study boards were again segregated from the kiln-run, very carefully reinspected, and the rough-dry grades recorded alongside the original marked grades, board by board. Each board was numbered on the end for identification after surfacing and the entire study run was put through the planers. Final inspection was done as it would be if the lumber were being loaded for shipment. Besides trimming and ripping, a few of the 5/4-inch and thicker boards were resurfaced to remove kiln stain and others had to be shaved down to the next lower standard thickness because of irregular sawing. Table 2 should be read downward for the percent of each surfaced grade resulting from each original green grade as marked by the study graders. For example, of the 1819 net board feet marked B and Better, 42.7 percent (or 427 board feet out of each 1000 feet marked) remained on grade, 32.1 percent dropped to C Select, 6.9 percent to D Select, and so on to 0.9 percent of edgings suitable for molding manufacture. The trim and rip loss was 3.2 percent of the marked net footage.

The rough-dry selling values per M B.M. of each original marked grade, assuming there were no grading errors and no degrade, appear in Column (6) of table 3. In Column (7) are the surfaced lumber selling values of what remained from each 1000 board feet of the original marked grade. Column (8) shows the percent of loss or gain in selling value based on the marked-grade values in Column (6). Note that thick No. 3 Clear and No. 1 Common were the heaviest losers, with losses of 23.9 and 23.5 percent, respectively. The largest gain in value was for marked Inch Shop, 25.9 percent of which (table 2) came out of the planer as 4/4 No. 3 Clear. Table 3 also condenses the data from table 2 so the relative amounts of up-grade, on-grade, down-grade and remanufacturing losses may be seen at a glance.

Table 4 summarizes by log sizes and log grades the actual rough-dry selling values per M B.M. of rough-dry lumber, the final surfaced selling values per M B.M. surfaced lumber tally, and shows the percent of depreciation or appreciation in selling value between rough-dry and surfaced lumber from the same logs. While table 4 and table 3 are not strictly comparable in respect to average study-run selling value,- table 3 being confined to the footage actually marked on the green-chain and table 4 including additional material that was missed by the green-chain inspectors,- they are similar enough to warrant a rough generalization, viz., that of the average study-run loss in value of 3.8 percent on the basis of the original marked footage, about one-half was chargeable to planer degrade and one-half to combined marking errors and seasoning depreciation.

The lumber selling prices used in this preliminary analysis are those published in the last edition of the 1934 lumber Code bulletin. The apparently low average values of the Select grades in table 3 are the result of the larger-than-average proportion of Short Selects developed from the smaller-than-average trees selected for study. In this connection, the reader should bear in mind that the average figures presented herein do not reflect general millrun average values and depreciation for the mill where the observations were made. The average mill run of this and similar mills contains a much greater proportion of large Select and Shop logs than were represented in the study sample.

Results of this study will be published later in greater detail. While it is too small a study to warrant very definite conclusions in respect to the comparative depreciation of different sizes and classes of logs and trees, the data strongly indicate that there may be rather large variations with variation in size and quality of raw material, and that straight-line discounting of green-chain grade values, irrespective of log size and log grade, may introduce very considerable errors in comparative final selling-value extensions. More studies of this type should be undertaken in all parts of the California region.

Table 1.- Numbers of trees in study by size classes, estimated cull in logs utilized, net scale, final surfaced lumber tally, percent of overrun and underrun, and comparative surfaced-lumber selling values of each size class.

Tree diam. group	Trees	Cull in logs sent to mill	Net scale Scribner	Surfaced lumber tally	Overrun surfaced tally over(+) or under (-) net scale	Selling value per M B.M. surfaced tally
inches	number	percent	feet B.M.	feet B.M.	percent	dollars
13 & 14	8	0.0	635	685	+8.7	17.64
15 - 19	22	0.4	4,560	5,138	+12.7	18.74
20 - 24	29	0.9	17,100	18,057	+5.6	19.73
25 - 29	18	0.9	16,570	16,945	+2.3	20.52
30 - 34	10	0.3	15,130	14,981	- 1.0	20.92
35 - 39	9	1.5	19,440	19,268	- 0.9	20.52
45 - 49	3	4.3	13,140	12,685	- 3.5	22.21
57	1	3.6	6,190	6,097	- 1.5	1/ 20.99
Study run	100	1.6	92,760	93,856	+1.2	20.56

1/ This was an isolated, limby, fast growing tree, very different from the average large trees in the same vicinity.

Table 2. - Ponderosa pine surfaced lumber grades recovered from different grades as marked on the green chain.

Surfaced grade	Grade marked by study grader on the green chain									
	B & Btr.	C Sel.	D Sel.	#3 Clear Thk.	#3 Clear 4/4	#1 Shop	#2 Shop	Molding	Pitchy Select	Inch Shop
	Percent of marked volume feet board measure									
B & Btr.	42.7	20.2	6.4	1.1	5.0	1.3	0.5	4.9		0.6
C Sel.	32.1	27.4	9.7	6.2	4.0	2.2	1.2	3.6		1.1
D Sel.	6.9	32.2	39.9	4.0	2.5	2.5	1.7	8.2	6.6	0.7
#3 Clr.	2.0	4.7	11.8	23.2	62.3	2.3				25.9
#1 Shop	1.4		1.4	28.8	-	26.4	2.0			
#2 Shop			2.2	24.5	-	48.8	49.4			
Molding	8.7	6.5	5.3	0.6	1.5		0.2	64.0		0.6
P. Sel.			2.3					0.5	60.1	
In. Shop	0.4	0.4	4.4		14.1	0.4				43.9
#1 Com.										
#2 Com.	0.1		0.5	-	1.5			1.0		3.7
#1 Dim.							0.4			
#3 Shop	0.7	0.4	1.8	0.6		4.2	21.9	3.2		
#3 Com.		0.4	3.9		1.4	0.5	0.8	1.7	3.9	11.9
#2 Dim.										
#1 Box	0.3	1.8	2.4	1.7	0.9	4.5	12.6	3.8		0.3
#4 Com.	0.4	0.5	1.1		4.8		0.3	2.5		9.3
#3 Dim.										
#2 Box			1.7		0.5	1.7	6.3	0.6	23.6	
#5 Com.								0.4		
Cull Box	0.2						0.1	1.4		0.3
Molding Strips	0.9	1.5	1.1	0.6	0.2	0.2				0.3
Total Surfaced	96.8	96.0	95.9	91.3	98.7	95.0	97.4	95.8	94.2	98.6
Trim & Rip loss	3.2	4.0	4.1	8.7	1.3	5.0	2.6	4.2	5.8	1.4
Total Marked	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
	Feet board measure lumber tally									
Marked	1819	1922	3566	1284	1932	5278	9472	840	153	2208
Surfaced	1760	1545	3419	1173	1907	5013	9235	805	144	2177

Table 2. (Continued) - Ponderosa pine surfaced lumber grades recovered from different grades as marked on the green chain.

Surfaced grade	Grade marked by study grader on the green chain									
	#1 Com.	#2 Com.	#1 Dim.	#3 Shop	#3 Com.	#2 Dim.	#1 Box	#4 Com.	#2 Box	#5 Com.
	Percent of marked volume feet board measure									
B & Btr.		0.1	0.1	0.1	0.1		0.1	0.2		
C Sel.					0.2		0.1	0.2		
D Sel.	1.3	0.4		0.6	0.6		0.4	0.6		0.9
#3 Clr.	0.7	0.2			0.7			0.1		
#1 Shop							0.1			
#2 Shop		0.1	0.6	15.8	0.6	3.2	1.3			
Molding		0.1		0.3	0.2		0.1	0.5	0.1	1.9
P. Sel.							0.1	0.3		
In. Shop		1.1			1.1			0.7		1.3
#1 Com.	9.2	1.6			0.2					
#2 Com.	74.3	47.2		0.4	14.0	0.5	0.3	2.2		
#1 Dim.		1.5	42.2	1.5	4.4	22.6	0.5			
#3 Shop		0.1	1.0	41.3	0.7		5.3		1.5	
#3 Com.	11.5	38.1		1.9	48.9		2.0	30.8	2.1	6.8
#2 Dim.		1.1	28.4		3.2	49.4	1.4	0.6		
#1 Box		0.7	15.9	24.5	7.2	11.2	45.3	6.8	13.8	9.7
#4 Com.	1.4	5.9	0.4	0.9	12.3		0.2	24.0	0.2	20.2
#3 Dim.		0.1	2.7		0.4	1.0				
#2 Box		0.2	6.4	11.1	3.2	10.2	41.5	26.1	78.0	42.0
#5 Com.		0.2			0.7			5.4	1.8	13.9
Cull Box								0.5	1.9	1.7
Molding Strips										
Total Surfaced	98.4	98.7	97.7	98.4	98.7	98.1	98.7	99.0	99.4	98.4
Trim & Rip loss	1.6	1.3	2.3	1.6	1.3	1.9	1.3	1.0	0.6	1.6
Total Marked	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
	Feet board measure lumber tally									
Marked	1507	16324	6588	3853	13222	2476	12672	3531	2873	387
Surfaced	1484	16118	6437	3773	13055	2430	12503	3496	2856	381

Note: An additional 12 bd. ft. of Cull Box which surfaced out as #2 Box and 21 bd. ft. of Molding Strips marked by the study grader are not included in the table.

Table 3.- Rough-dry values of lumber grades as marked by the study graders on the green chain, compared with actual selling values of the same lumber after surfacing.

(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Study grader's green-chain grade	After seasoning and surfacing, percent of marked rough volume - to higher grades:	on grade:	to lower grades:	rip & trim loss	Rough-dry selling value per M feet of marked green-chain grade	Value after surfacing per M B M of original marked footage	Loss (-) or gain (+) in value percent
B & Better	-	42.7	54.1	3.2	$45.04	$40.12	-10.9
C Select	20.2	27.4	48.4	4.0	41.15	37.40	- 9.1
D Select	16.1	39.9	39.9	4.1	36.02	31.67	-12.1
#3 Clear, thk.	11.3	23.2	56.8	8.7	38.17	29.06	-23.9
#1 Shop	8.3	26.4	60.3	5.0	27.50	24.24	-11.9
#3 Clear, 4/4	11.5	62.3	24.9	1.3	25.25	26.02	+ 3.0
#2 Shop	5.4	49.4	42.6	2.6	21.00	20.52	- 2.3
Molding	16.7	64.0	15.1	4.2	22.25	24.22	+ 8.9
Pitchy Select	6.6	60.1	27.5	5.8	22.75	20.59	- 9.5
#1 Common	2.0	9.2	87.2	1.6	29.75	22.76	-23.5
#2 Common	2.5	47.2	49.0	1.3	21.90	19.97	- 8.8
#1 Dimension	0.7	42.2	54.8	2.3	22.41	19.42	-13.3
Inch Shop	44.5	43.9	10.2	1.4	15.00	19.71	+31.4
#3 Shop	18.7	41.3	38.4	1.6	17.25	17.80	+ 3.2
#3 Common	21.7	48.9	28.1	1.3	16.52	17.83	+ 7.9
#2 Dimension	26.3	49.4	22.4	1.9	17.73	18.69	+ 5.4
#1 Box	11.7	45.3	41.7	1.3	15.00	15.16	+ 1.1
#4 Common	43.0	24.0	32.0	1.0	11.91	14.87	+24.9
#2 Box	17.7	78.0	3.7	0.6	12.25	13.51	+10.3
#5 Common	82.8	13.9	1.7	1.6	7.25	13.17	+81.7
Study run, all grades	13.0	44.3	40.7	2.0	$21.06	$20.26	- 3.8

(2)-(4) See table 2 for the percent of each higher and lower grade recovered.

(5) These figures include some footage loss from resurfacing miscut and stained boards as well as trim and rip losses. Edgings salvaged for molding strips are included with the "grade" percentages, not with the "loss".

(6) Rough-dry selling prices applied to marked rough green grades in Col.(1). The low average values of Selects result from a large proportion of shorts.

(7) Note that this is the final surfaced-price selling value of 1000 feet of the original marked-grade footage, not the value of 1000 feet BM surfaced tally.

(8) Percent based on values in Col. (6). Ex. 45.04 - 40.12 = 4.92 loss, ÷ 45.04 = -10.9 percent. Costs against surfaced lumber must be increased by planing cost per M to get net gain or loss.

Table 4.- Selling values per M feet B. M. lumber tally of rough-dry and surfaced lumber from ponderosa pine logs of different sizes and log grades, and percent of actual rough-dry value lost (-) or gained (+) by surfacing, allowing for footage lost from trimming and ripping.

Log grade	(See foot notes)	Log diameter group, inches									Average for log grade
		8-9	10-14	15-19	20-24	25-29	30-34	35-39	40-44	45-49	
Select	Logs, number		2	24	14	8	2	1	3		54
	Rgh.val.MBM $		20.45	22.60	24.25	23.09	27.60	27.64	26.73		24.34
	Surf.val.MBM$		19.11	22.31	24.31	22.66	27.69	27.33	26.78		24.16
	Val. depr. %		-6.70	-2.64	-0.66	-4.39	-2.88	-2.58	-1.74		-2.47
High grade Shop	Logs, number			15	5	5	1	2		1	29
	Rgh.val.MBM $			20.65	21.24	20.14	21.39	25.27		23.32	21.47
	Surf.val.MBM$			20.87	20.96	20.57	20.28	25.78		22.84	21.50
	Val. depr. %			-0.34	-1.92	-0.61	-6.39	-2.96		-6.21	-2.45
Medium grade Shop	Logs, number		4	14	26	15	7	-	2		68
	Rgh.val.MBM $		16.80	18.75	19.54	20.68	21.18		24.00		20.45
	Surf.val.MBM$		18.04	19.44	19.80	20.78	20.39		22.80		20.39
	Val. depr. %		+3.46	+3.08	-0.02	-1.10	-5.46		-8.85		-2.00
Small-knot Common	Logs, number	28	174	91	24	4					321
	Rgh.val.MBM $	17.92	18.62	19.36	20.71	18.10					19.23
	Surf.val.MBM$	17.75	18.58	19.24	20.06	17.91					19.03
	Val. depr. %	-1.68	-1.32	-1.21	-4.42	-2.20					-1.95
Large knot Common	Logs, number		7	10	3	1					21
	Rgh.val.MBM $		16.83	16.81	17.08	16.15					16.81
	Surf.val.MBM$		17.12	17.20	16.85	15.78					16.98
	Val. depr. %		+0.63	+0.90	-3.41	-2.26					-0.35
All grades	Logs, number	28	187	154	72	33	10	3	5	1	493
	Rgh.val.MBM $	17.92	18.54	19.79	20.85	20.80	22.41	24.54	25.51	23.32	20.68
	Surf.val.MBM$	17.75	18.52	19.80	20.73	20.77	21.72	24.84	25.02	22.84	20.55
	Val depr. %	-1.68	-1.25	-0.85	-1.80	-2.09	-4.98	-2.84	-4.73	-6.21	-2.09

Logs, number - Number of mill-length logs sampled in each size-grade class.
Rgh. val. MBM$ - Selling value per MBM rough-dry lumber tally at rough lumber prices.
Surf.val. MBM$ - Selling value per MBM surfaced lumber tally at surfaced lumber prices.
Val. depr. % - Percent of actual value loss (-) or gain (+) based on rough-dry values adjusted for differences in rough-dry and surfaced footages.